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ODSJEK ZA ANGLISTIKU/ODSJEK ZA FILOZOFIJU

Luka Rek

SEMANTICS' BARBER SHOP: COGNITIVE SCIENCE WENT WRONG WHERE?

Diplomski rad

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Summary

This thesis deals with the central questions cognitive science needs to tackle. The first chapter provides a general introduction into the subject matter.

The second chapter explains the methodology used both by the author of this thesis and by other individuals that contributed to the arguments present in the thesis in one way or another.

Chapters three to five go on to deal with the basic building blocks of cognitive science – the central ideas that best describe the endeavor of cognitive science. Every chapter has the same structure. It starts with a general introduction regarding the idea in question, followed by an argument that poses problems for cognitive science, which is in-turn followed by a possible or real counter-argument. Every chapter ends by a small conclusion – a summary and a synthesis of the previous arguments.

The final chapter tries to encompass the implications behind the summaries of earlier arguments, as well as provide advice and guidelines for future development and research.

Key words: Cognitive science, Philosophy of mind, Philosophy of language, concepts, RTM

Frizerski salon Semantika: Kognitivna znanont je pogriješila gdje?

Sažetak

Ovaj diplomski rad bavi se centralnim pitanjima s kojima se suočava kognitivna znanost. Prvo poglavlje služi kao opći uvod u tematiku.

Drugo poglavlje objašnjava metodologiju kojom se služi autor ovog diplomskog rada ao I metodologiju drugih pojedinaca koji su doprinijeli argumentima koji se u radu javljaju.

Poglavlja tri do pet bave se osnovnim pojmovima unutar kognitivne znanosti – centralnim idejama koje čine bit onoga čime se ta grana znanosti bavi. Sva tri poglavlja imaju istu strukturu. Poglavlja započinju općim uvodom o pojmu i njegovoj podlozi, nakon čega slijedi argument koji pred kognitivnu znanost stavlja određenu problematiku, kojeg pak slijedi potencijalni ili realni protuargument. Sva tri poglavlja završavaju s kraćim zaključkom – sažetkom i sintezom izloženih argumenata.

Zadnje poglavlje pokušava izložiti implikacije pojedinih sinteza prijašnjih zaključaka te dati preporuke I smjernice za buduće djelovanje i istraživanje.

Ključne riječi: kognitivna znanost, filozofija uma, filozofija jezika, koncepti, RTM

1.0 INTRODUCTION

The main problem with philosophers is when they start to consider how their metaphysical claims influence empirical data. The main problem with scientists is when they start to consider how their empirical findings influence metaphysical claims. In the 21st century it's not realistic to expect that various areas of expertise won't overlap and that experts from these various fields won't hold incompatible views on crucial points for those areas. Such is the case with certain philosophers of language and cognitive scientists (i.e. philosophy and cognitive science).

It is understandable that a philosopher will approach the subject of language and cognition from a more metaphysical, or at least an a priori, standpoint while a cognitive scientist will focus on research data. In truth, every empirical theory rests on a rather noticeable set of metaphysical assumptions. To be even more general, the whole empirical science paradigm rests on those same metaphysical assumptions. "What may those be?" - You would be inclined to wonder.

I will answer with a question. What do all empirical sciences have in common? Research methods. All empirical sciences need to employ the same rules that govern how research is done, how information is gathered, processed and quantified. All of these rules guard against theories that can't be refuted or theories that can't be proven. For example, it guards against a particular set of skeptical arguments about some brains in pots, I think[1]. However, in guarding against

[1] The argument goes: Imagine your brain has been somehow miraculously removed from your body and transported into an appropriate (for some reason glass in most versions) container with all your brain functions intact and your brain was connected to some advanced technology that enabled it (or you) to have an experience of continuing to live the ordinary life you've been living up to the horrible moment when your brain was removed from its original host. If that were the case, then, surely, all our perceptions would appear to be warranted to us, yet their cause would be something completely different from what our brain would make us perceive. If such a world were real, how would you be able to tell it apart from the world you're in now? In other words, how can you ever know that you are not, in fact, a brain in a suitable container?

skeptical attacks, empirical sciences draw a number of metaphysical claims themselves. Yes, these claims are highly intuitive and backed up by every single physical law that has been discovered. Here they are:

1. I exist as a being.

2. There is such a thing as the outside world.

3. I have perceptions of the outside world.

4. These perceptions are accurate enough to allow me to arrive at scientific laws through induction.

In order for a theory to be relevant it needs to be consistent and it needs to be both verifiable and falsifiable. Coherence is the main focus of philosophers and most scientists prefer theories which support their empirical data even if the theory itself is semantically inconsistent. Verification and falsification is the main focus of scientists and most philosophers prefer theories which are semantically consistent but they neglect empirical data and are not as concerned with the explanatory power of a theory as scientists are. This kind of situation often results in philosophers criticizing theories derived from empirical data for lack of semantic consistency and scientists criticizing metaphysical theories for lack of explanatory power. As it stands, there's no helpful exit from this vicious cycle.

However, empirical theories are one of the main derivatives of the scientific method so it is unacceptable to throw them away on the account of semantic inconsistency. A theory that bears some explanatory power has the potential to be amended as new data comes in and there is also no restriction to philosophers' input regarding its semantic consistency. Ideally, this is how interdisciplinary endeavors ought to be undertaken: A scientist gathers data by doing research. After enough data has been accumulated, the scientist works on a theory that would account for

the data. At the point where the theory has been formulated so that its explanatory value is the highest possible, it should be open to experts from other fields like philosophy so that the experts from those fields can assess its strong and weak points. Any semantic inconsistencies should be pointed out and dealt with while taking care that its explanatory power isn't diminished in the process. In the end a final definitive theory should be formulated and be free of any inconsistencies while having full explanatory power. This is, of course, an idealized version of a process that usually works and turns out very differently in practice.

That's a bit high on the Utopian scale. It is true that philosophers have expanded into natural sciences by „going with the times" and using the newest findings to support their own philosophical systems (Daniel Dennett, Jerry Fodor and Steven Pinker are just some of the names that come to mind). It is also true that scientists from natural sciences have dabbed into philosophy, either by carelessness or curiosity. Stephen Hawking and his metaphysical interpretation of quantum theory[2] is a good example. This is an interpretation based solely on numbers. Hawking chose the semantic interpretation with all of its metaphysical baggage and concludes that the fact that it fits the math makes the interpretation (and its aforementioned implications) true.

Scientists being data-driven and philosophers being theory-driven, both feel that their approach is the definitive one. This is partially so because philosophers have the need to justify their pay checks and scientists have the need to show how the data they gathered is useful (which amounts to practically the same thing).

Looking at the historical picture, philosophy was the mother of what is called science today. However, the distinction between a philosopher and a scientist got more and clearer as time passed. Eventually, the cumulative knowledge in different areas crystallized into specific scientific areas that were no longer dependent on their philosophical roots.

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[2](Hawking, 2010)

This process of cultural modularization of knowledge means that the territory of philosophy is gradually diminishing. There is, for instance, no longer anything corresponding to philosophy of nature, in which the constitution of matter is discussed. In contrast, there is still an area of philosophy of mind because discussions about the nature of the mind have not in the general opinion reached a stage of solidity in which they can be discussed in isolation from the overall framework. Austin envisaged a period in which also the area of language might come to constitute an independent domain—and this is a natural perspective for viewing the relationship between Cognitive Linguistics and philosophy.[3]

On a completely general level, theory and experience are both constitutive of a progressive insight into the nature of things. However, experience is the starting point. There is no concession that in anything resembling a scientific endeavor experience must be its starting point. You might have a theory on things you have not experienced (second-hand experiences or something similar), but unless you do happen to experience those things your theory will remain just a theory. Experience is necessary in order to verify or falsify your theories and is necessary to even stipulate any possible laws governing the phenomena one is documenting.

Well, what about theories you might have that can neither be verified nor falsified? In that case you have a metaphysical theory, and metaphysical theories are not and should not be parts of any sciences. In that respect, a philosopher's choice is clear (if he/she does not consider constructing metaphysical theories his main occupation) – he can learn from experience and experiments done by sciences in order to produce a coherent theory. That theory might not be on the level of a mathematical proof of the four major forces in the universe, but it can be in agreement with experience and might contain something more than just layers of metaphysical dough.

Of course, not even the most optimistic of philosophers would dare to dream of a universe in which philosophers produce theoretical systems for sciences. Scientists have first-hand experience with the subject matter they are researching and have the best tools to gather and

[3] (Geeraerts & Cuyckens, 2007)

analyze the data for the research. Their theories are a reflection of the data they gathered and the tools they employ (math being the most universal). As such, scientists are self-sufficient in their endeavor. There would be no point in bringing a philosopher into the fray since he/she will, on average, have a lower level of proficiency in gathering and analyzing empirical data and producing mathematical theories that account for the phenomena in question.

However, scientists don't deal with meaning. They deal with numbers. As human beings, we have a tendency to interpret and give meaning to everything. Therefore, although a mathematical theory should just be a mathematical theory, scientists will inevitably draw conclusions that contain a surplus of meaning not present in the numbers themselves. In this way a mathematical theory starts to have a supporting semantic theory that is like a backdrop for the raw math. At this crucial step, scientists often find themselves at a loss because the history of the evolution of natural sciences holds numerous examples of scientists making very different interpretations of the same theoretical framework.

This is where philosophers come in. Good philosophers are good logicians, and good logicians notice a lot of ideas and their connections even when they don't understand the raw math. Something that "fits the math" might have an inherent semantic inconsistency in it. On the level at which quantum physics operates, our "normal" ideas of how the world works break down. No one is discussing the math since the math is not a problem – the interpretation is.

And while many assume that the ones best qualified to interpret the data are the same experts who gathered the data and formulated the mathematical laws underlying the phenomena in question, the truth of the matter is that sometimes they can't see past the math. A recent example is of an experiment involving neutrino particles that resulted in measurements which suggested that the particles were able to travel faster than light. Certain excitable scientists were on the verge on announcing a new age in physics where Einstein's theory of Special Relativity is replaced by a new one where traveling beyond the speed of light would be possible (Star Trek fans rejoice!). Unfortunately, it turned out that the readings were off because of some

miscalculations on the machines' part. And so Einstein remains, and philosophy does too. This is the downside of the whole empirical science – we are dependent upon readings and measurements and other empirical data and our theory can only be as precise as our measuring instruments are.

1.1 What philosophers of language do (and why should scientists care)

Jerry Fodor has been looking out for reductivist threats since the 1970s. Believing that the mental might be free of behaviorist's shackles, a new, unexpected danger came in the form of the expanding area of natural sciences. This has been a natural process occurring throughout the last couple of centuries, beginning with philosophers who investigated nature. And after all that time, philosophers like Jerry Fodor feel that philosophy still has a thing or two to say.

Philosophy has been the starting point of what we call the "proper" sciences we have today as well as of what some people think are "improper" sciences. As such it is also present in cognitive science, but most often in a purely symbolic form – as the ancestor of what is today called cognitive science - a multidisciplinary scientific endeavor where non-empirical sciences can barely play a supportive or inspirational role. Is that all there is to it? Should we consider all philosophers as mere muses that provided the necessary prerequisites for the formation of cognitive science but are no longer active participants in this endeavor?

Surely, that is not the case. Does anyone think you can have a genuine theoretical framework without experts not only in the field in which the study has been done, but also experts in semantics and logic? This may seem redundant if you have experts from the field in which the study has been done, but it is not a rare case that experts forget or overlook something that would've caught the logician's eye or the eye of the semanticists. But why would philosophers of language be the most helpful in this regard? Here's a brief description of the philosophy of language:

The branch of philosophy which studies the properties of human languages. There are many aspects of language which are of equal interest to linguists and to philosophers, particularly (though not exclusively) in the domain of semantics (the study of meaning). Philosophers of language are often interested in such questions as how a piece of language can refer to the real or conceptual world, how the truth or falsehood of a statement can be determined, how the meaning of an utterance depends upon its context, and what the relation is between language and mind. Though philosophers have pondered problems of language since ancient times, the subject was particularly stressed in the late nineteenth century by the German philosopher Gottlob Frege, who is consequently often regarded as the father of the discipline.

Philosophers of language are, obviously, philosophers. This means that they have a fairly developed knowledge about theoretical systems, coherence and meaning. They are also more conscious of problems of ambivalence, interpretation and the like. Furthermore, their explicit knowledge of logic has been proven to be the best tool against the problems of ambivalence and theoretical inconsistency. Any theoretical system must be construed with the following things in mind:

i. Consistency (soundness) – All propositions that can be expressed within a certain theory with the defined logical and semantic operators must exhibit a selected property.

ii. Completeness – All propositions that exhibit a selected property are expressible within the theory.

iii. Overall complexity – the quantity and relative complexity of rules and operators the system needs in order to work.

iv. Explanatory power – The amount of epistemological data that can be predicted and accounted for by the theory.

The rigidity of these rules is absolute. Even scientists regularly encounter decisions regarding iii. and iv. as they are especially important when we have more than one theory. The first two conditions are decidedly about logic and no scientific expert can compensate his or her lack of knowledge about logic by specialized knowledge of the field in question since logic is the irreplaceable king of all meta-languages:

[Meta-language is]A language used to talk about another language. Linguists, philosophers and many others often need to talk about particular languages, or about languages in general. Naturally, the discussion itself has to be couched in a language of some sort, and this fact can quickly lead to hopeless confusion if we are not careful. We must therefore distinguish carefully between the object language (the language which we are talking about) and the metalanguage (the language we are using to talk about the object language). It is perfectly possible to use, say, English as a metalanguage in order to talk about English as an object language, and indeed we do this all the time, but it is precisely here that confusion can most quickly arise: if we fail to distinguish between the English we are talking about and the English we are using to talk about it, we can easily become lost. Consider the following example. Using English as a metalanguage to talk about English, we may assert the following: a grammatical English sentence may not contain two consecutive instances of the preposition "of". This is true. But beginning students often challenge this by pointing to examples like this very sentence: the grammatical functions of "of" in English are numerous. Is the sentence itself a counterexample? No, it is not. It appears to be a counterexample only if we confuse the metalanguage with the object language. The statement above is a statement in the metalanguage, and the first occurrence of "of" in it is part of that statement. But the second occurrence of "of" is different: this is merely a piece of the object language, one which we happen to be talking about here. That is, the first "of" is doing what "of" normally does, while the second "of" is doing nothing at all: it is merely being talked about. If this is not obvious, observe what happens when the object language is French: the grammatical functions of "de" in French are numerous. Here it should be easy to see that the French preposition "de" is doing nothing in this English sentence except being talked about. The two instances of "of" are an example of what philosophers call the use-mention distinction: the first "of" is being used normally, while the second is merely being mentioned (talked about): the

latter could appear in italics or in scare quotes to signal this graphically. At the very least, when we use English as a metalanguage to talk about languages, we need to invoke a battery of technical terms and concepts, just as a specialist studying physics, music or psychology needs to invoke technical terms and concepts. In fact, we sometimes go further, and invent a special artificial language to use as our metalanguage. The various types of formal logic used by logicians, philosophers and linguists for describing English and other languages are just this: specially invented metalanguages.[4]

It is important to note that consistency and completeness as defined here are taken in their broader sense. The "selected property" referred to in the definitions can vary depending on the function of the theory in question. In the narrow sense, "selected property" is always and only truthfulness of the propositions. In this sense, logicians and scientists are at odds since scientists' preferred property is the explanatory power of the theory. Going in this direction is a "natural" thing for the scientist, but it puts the truth values of the propositions within the theory at second place. When this happens, scientists tend to overlook inconsistencies between propositions as long as those inconsistencies aren't mathematical and they don't have a negative impact on explanatory power of the theory in question.

When it comes to these conditions, philosophers of language are unequivocally the ones that are the most adequate for assessing them. Of course, scientists need to work together with them since the specialized knowledge of the field is equally essential in formulating the theory that is supposed to explain it.

But the same question emerges again: Why philosophers of language? Why not, for example, linguists? The answer is simple. While linguists might have a more detailed knowledge about the inner workings of language(s), philosophers of language are the only experts that bridge the gap between qualitative data (meaning) and quantitative data (mathematics in hard sciences) by being

[4] (Trask, 2007)

able to put it into a logical form. This ability is the key in the process of theory formation and that is also why scientists should care about the existence of philosophers of language and sometimes listen to what they have to say.

It is sometimes hard for a scientist dealing with minute calculations and condition regulation to understand philosophers' input, and sometimes they don't even listen. It's not that they don't care, but they know their method works and that there's no point in dwelling on the metaphysical implications or the apparent semantic inconsistency or unfoundedness of any of the theoretical concepts contained in the system. But if we are to have a unifying theory within a multidisciplinary endeavor, we will be forced to accommodate for both the philosophically/logically/semantically inclined sciences and the mathematically/empirically/practically inclined ones.

It is important {to} always bear in mind the fact that cognitive linguistics is not a unified theory of language, but, as has been stressed time and again, a flexible and evolving theoretical framework. Whether this evolving theoretical framework can stabilize into a unified theory is an open question. Or, one could ask, whether such unification and conformation would ultimately be a necessary or even welcome development.[5]

1.2 What (cognitive) scientists do (and why should philosophers of language care)

The scientific method and the whole empirical science paradigm have grown over the last century into the only real source of progress in terms of knowledge. Of course, this progress also led to the development of new technologies and these, in turn, created new methods of research. This has enabled the empirical science findings to grow at an almost exponential rate. So, what is it that scientists in general do and why has it turned out to be so reliable?

[5] (Brdar, Gries, & Fuchs, 2011)

According to previous empirical findings, scientists choose their next empirical research subject. Where no suitable previous empirical findings exist, non-scientific empirical data can be used as the starting point. The scientists then form a hypothesis (a hypothesis is a statement where the scientists try to predict what the results of the research are going to be and where they explain the basis on which they are making that sort of assertion).

After the hypothesis has been chosen, scientists choose the best methods for verifying or falsifying the hypothesis. After the research is carried out, scientists analyse data and compare them to the results they were expecting according to the hypothesis. If the results are not even close to what was predicted, there's almost no chance that the hypothesis is true (the small chance exists if errors were done during data gathering or analysis). If the predictions were on the mark, then your hypothesis is verified. Note that for something to become a scientific theory it needs to be thoroughly verified (for example, theory of evolution has been verified at least ten thousand times and falsified 0 times).

As the predictions get better, so does the advancement in data gathering and the more data is gathered, the easier it is to make more hypothesis and better predictions, and so on. This is the opposite of a vicious cycle. Sciences are self-fuelling and mostly self-contained.

A philosopher does not really have a choice. Sure, one can still have a philosophical system that contains the proposition that claims that all things are made of water, but it kind of doesn't pay the bills (not even the water bill).

2.0 METHODOLOGY

With this being an interdisciplinary meta-research project, we will inevitably encounter and employ both theoretical/analytic methods preferred by philosophers and empirical methods preferred by researchers. Note that this does not exclude the possibility of either of these using both. This will be done as objectively as possible, as a clear indicator of the positives and

negatives of both methods. Our own research consists in gathering arguments and counter arguments explicitly stated or implicitly present in empirical findings and/or theoretical frameworks of cognitive science and philosophy of language. Therefore, our own research is both empirical and theoretical/analytic.

It is empirical because it monitors and reports on the status of evidence gathered by empirical research. It is theoretical because it extracts implications present in the analysis of empirical findings done by empiricist researchers and reconstructs a sketch of the theoretical framework behind it. It is analytical because, in doing so, it follows the general rules of logic and analytic philosophy.

2.1 Theoretical/analytic methods

Ever since the time of Frege and Russell, logic as a discipline can be considered a fundamental tool in operating with ideas or concepts in general. Small letters of the alphabet (e.g. p, q, r...) were used to symbolize statements (statements being meaningful linguistic units) and logical operators were used to symbolize various relations between statements (e.g. logical operator „AND“ is symbolized by „/\“ and it implies that the two statements connected by the symbol are in such a relation where both have to be true in order for the relation to be true as well). In logic, the truth of a complex argument is a simple matter of calculating the truth value of its constituents. This type of analysis is decidedly non-empirical, yet it can be applied to empirical findings.

How does one apply a system of symbols and rules to empirical research? Well, there’s always some kind of meaning contained in the research. This meaning is usually the product of scientists’ interpretation of the data in accordance with a certain theory. This meaning can then be expressed with a proposition, and that proposition can be true or false, which is determined by a simple operation on the constituents of the proposition and the rules determining their relationship.

This might seem counter-intuitive, but all theoretical systems must be expressible in some form of symbolic logic. If it isn't possible to do that, then the system contains a semantic inconsistency, which makes the theory wrong in its semantic and metaphysical implications even if the theory explains the numbers and allows us to make predictions.

2.2 Empirical methods[6]

Empirical methods have been used to make findings even long before the word 'empirical' was ever used. However, what we think of when we use the expression in this paper is a concept whose conceptual base necessarily involves the following factors:

1) Methodological soundness,

2) Experimental confirmation**,**

3) Consistent (if not complete) theoretical framework,

4) An interpretation of collected data in accordance with **3.**

Any findings can easily be replicated and the interpretation confirmed by other scientists if propositions **1-4** are true. Scientists can arrive at false conclusions with 1),2) and 4) being true and only 3 being false. What's worse, if the theory used by the scientist is generally accepted,

[6] (Fodor, 2003)

then other scientists would replicate the results and confirm the interpretation and then the interpretation might even become a “fact” among the general public. One particular instance where a completely true proposition yielded very wrong conclusions concerns the true proposition “We can only use about 15% of our brains at maximum”. This means that only about 15% of the neurons in your brain are active at one particular point in time. This does not imply that we can increase the percentage, nor does it imply that we even should. Normal cognitive functioning can only occur where the brain functions in a certain way. If sitting on a sofa made your brain think you’re eating a popsicle, you wouldn’t function all that better, would you?

2.3. Structure

There are three main chapters. Each of the chapters corresponds to one main argument. Structurally, each chapter follows the same basic form:

X.0. – Chapter introduction.

X.0.1., X.0.2., X.0.3… - Introduces the necessary concepts, premises and/or logico-syntactic apparatus.

X.1. – The main argument.

X.2. – The corresponding counter-argument(s)

X.3. – A synthesis of the conclusions of arguments and their implications.

3.0. CONCEPTS

Concepts are the modern equivalent of what was generally referred to as ideas and was introduced first as a philosophical term by Plato. Plato's ideas were independent of individuals (i.e. Plato claimed that ideas exist regardless of individuals possessing or not possessing them). After Plato, ideas soon became the polar opposite of "real beings". Generally speaking, ideas were now nested in the mind and were seen as subjective, unlike things as such (Kant's exposition of this being the most well-known). Over the course of the years the term "idea" had been used in so many different ways that, when new sciences that were in need of theoretical constructs emerged, they adapted the concept of "ideas" into a new theoretical construct – "concepts".

The metaphysical status of concepts has been the object of a large number of heated debates. As was mentioned, Plato ascribed them real existence. If anything, he considered them more real than the real world. In times much closer to our own there are almost no representatives of the Platonic view to speak of. Concepts and other mental entities are now in the sphere of the subjective, or the mental at least.

Concepts in general are rather problematic in their nature. During the period of the behaviorists' endeavor such things were rejected on the premises that no reference to anything mental needs to be used to explain human behavior. However, with the fall of behaviorism as a movement, mental entities were no longer off limits. This meant that new theories were able to come to life that would be able to shed light on some aspects of human behavior that cannot be diluted to a pure action-reaction explanation favored by behaviorists.

Behaviorism was especially keen on limiting the extent to which psychology and similar disciplines were given leeway in explaining behavior by referring to mental phenomena. In Fodor's 1975 book *Language of Thought,* he talks about the two reductionisms that are forced upon psychologists and other scientists that deal with mental and similar entities that cannot be completely empirically accessible from the outside. This is a general rule for all "non-hard" sciences. Fodor writes the following:

The integrity of psychological theorizing has always been jeopardized by two kinds of reductionism, each of which would vitiate the psychologist's claim to study mental phenomena. For those influenced by the tradition of logical behaviorism, such phenomena are allowed no ontological status distinct from the behavioral events that psychological theories explain. Psychology is thus deprived of its theoretical terms except where these can be construed as nonce locutions for which behavioral reductions will eventually be provided. To all intents and purposes, this means that psychologists can provide methodologically reputable accounts only of such aspects of behavior as are the effects of environmental variables.[7]

Continuing:

Not surprisingly, many psychologists have found this sort of methodology intolerably restrictive: The contribution of the organism's internal states to the causation of its own behavior seems sufficiently undisputable, given the spontaneity and freedom from local environmental control that behavior often exhibits. Behaviorism thus invites us to deny the undisputable, but, in fact, we need not do so; there is an alternative that frequently gets endorsed. We can acknowledge that behavior is largely the effect of organic processes so long as we bear in mind that these processes are organic: i.e. that they are physiological processes located, presumably, in the nervous systems of organisms. Psychology can thus avoid behavioral reduction by opting for physiological reduction, but it must opt one way or the other.

As a bearer of ill news, the psychologists predicament described by Fodor seems to be shared by a far wider community of scientists outside the "hard sciences" today. But even then, Fodor saw what was in store for us:

Either way, the psychologist loses. Insofar as psychological explanations are allowed a theoretical vocabulary, it is the vocabulary of some different science (neurology or physiology).

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[7]All the passages are from (Fodor, 1975)

Insofar as there are laws about the ways in which behavior is contingent upon internal processes, it is the neurologist or the physiologist who will, in the long run, get to state them. However psychologists choose between the available reductions, their discipline is left without a proprietary subject matter. The best a working psychologist can hope for is an interim existence eked out between the horns of this dilemma and (just) tolerated by colleagues in the 'hard' sciences.

By distinguishing concept acquisition and concept use, scientists have made an agreement (albeit an unspoken one) to partially separate the domains of the empirical and the domain of the mental. Thus philosophers can talk about having concepts without bothering themselves with finding ways of confirming concept possession and "real scientists" can do their work in peace.

3.0.1 Concept acquisition

Most people believe they know what it means (for them, at least) to have a concept of something. The word itself is no longer a rare occurrence. Cognitive scientists, as Fodor suggests, are also known to assume such things without explicitly mentioning them:

There is, I think, a pretty general consensus in the cognitive science literature about what makes a kind of concept acquisition a kind of concept learning. Roughly, it is that concept learning is a process of inductive inference; in particular, that it is a process of projecting and confirming hypotheses about what the things that the concept applies to have in common. (I'll call this the HF model of concept learning hereinafter.) But though this consensus is pretty general, it is much more often than not inexplicit. There are very, very many theorists who accept HF without fully realizing that it is HF that they accept. I imagine, indeed, that is the usual case. Some exposition is therefore required. Over the years, a truly remarkable number of cognitive scientists who think that concept learning is a kind of inductive inference have assured me that they do not think that concept learning is a kind of inductive inference. (As I write this, I'm just back from a large cognitive science conference where almost everybody thought that concept

learning is a kind of inductive inference and almost everybody denied that they did. My nerves are in terrible shape.)[8]

Here Fodor mentions concept acquisition and concept learning. The basic premise is this: You acquire concepts by learning to apply them to things. There are a lot of hidden implications here. If concept acquisition is a type of concept learning, that necessarily implies that the concepts we do possess are completely determined by our personal experience. This means that there are no constraints on the process of concept learning, which is bad. Also, it implies that there are no concepts that one must learn, which is worse.

For us, concept acquisition will be of more importance. „Concept learning" refers to the empirical aspect of concept acquisition, while „concept acquisition" is a more general concept that encompasses any and all modes of acquirement of concepts that results in the fulfillment of all possession conditions of concepts in question.

3.0.2 Concept use

Concept use assumes you possess the concept that you are supposed to use. Logically, you can use a concept if you possess it. Generally, cognitive scientists have made good use of situations where, according to their theory, a person can be tested for possession of certain concepts. In these situations the person would have to use the concept he is supposed to possess in order to resolve the task in front of him. But notice the irregularity of the statement just made. You can use a concept if you possess it, but you don't have to. The argument would go something like this: No conditions are so perfect that a failure to use a concept would imply that one does not possess it. This is the basic skeptics' response and shouldn't be taken too seriously, but it definitely cannot be neglected.

[8] (Fodor, 2008)

The practical problems of deriving concept possession from concept use are evident. There is no direct link to a person's mind, so research only has concept use to go on. Since that is so, any evidence about concept use might be evidence of concept possession, but can also be evidence of people using heuristic methods or evidence of the inappropriateness of the research methods employed. That being said, there seems to be an argument that sets out to prove that no amounr of empirical data on concept use can be used to ascribe concept possession regardless of how favorable the conditions.

3.1 Concepts are not epistemic capacities

Let it be that a concept is recognitional if and only if:

1. *It is at least partially constituted by its possession conditions; and*
2. *Among its possession conditions is the ability to recognize at least some things that fall under the concept as things that fall under the concept.*[9]

The argument's main line of attack is denying that the second proposition is true. Furthermore, the notion of a satisfier for a concept is needed to lay out the argument.

The satisfier(s) for a concept are the states, capacities, dispositions, etc. in virtue of which one meets the possession condition(s) for the concept.[10]

This conclusion seems all the more plausible if it is coupled with the notions of compositionality and learnability of language(s).

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[9] (Fodor, 2000)

[10] (Fodor, 2000, p. 36)

Compositionality of lexical items is one of the basic characteristics of natural languages. Basically, it is what makes learning a language possible. Every language is systematic and productive and compositionality is a universal emergent property of every natural language with those properties.

Systematicity of a language system is the property that is evident from the fact that any language is governed by a limited number of rules with a limited number of exceptions. Putting things into neat folders is one way of visualizing it.

Productivity of a language system is defined as the property that allows for a potentially infinite number of unique instances of language by relying on a relatively limited (or non-infinite) language base.

Generally speaking, compositionality is a characteristic of natural languages that allows language users to derive the meaning of complex expressions by referring to simple expressions. More specifically, host expressions "inherit" properties from the simpler expressions they are comprised of. For example, if we know what COW and RED mean, we'll probably be able to guess what RED COW means, even if we've never seen a red cow or heard the expression before.

By analogy, the same applies to concepts. Now, the relation between languages and concepts is a complex one and it would be far out of the scope of this paper to delve into it. Arguments from analogy are the weakest form of arguments, but concepts are not analogous to language – they are a necessary precondition for language.

We may not be sure of what concepts are, but if we define them as those phenomena that enable us to understand a linguistic unit, then we can be fairly certain that emergent properties

such as compositionality do apply[11]. For example, knowing what "red" means is nothing more and nothing less than having the concept RED. Of course, one can have a concept RED while not knowing what "red" means.

Learnability of natural languages stems from those properties mentioned earlier. The fact that one can predict the function and meaning of simpler linguistic units within a more complex one makes it possible for a being with limited information storage capacity to potentially produce an infinite number of unique linguistic units by acquiring a finite language base.

In view of these characteristics of natural languages and the functional definition of concepts, one cannot deny the compositionality of concepts unless one denies it for language as well. If one does that, learnability is jeopardized as well.[12]

In order to move the argument along, we'll spell out what compositionality means in terms of concepts. In light of the given definitions of what recognitional concepts and the satisfier(s) for a concept are, compositionality can be defined as the property which guarantees that some or all satisfiers for a simpler concept are also the satisfiers for a more complex concept that contains the simpler one. In terms of logic:

> S is a satisfier for a complex concept CC if and only if S is a satisfier for concept C (which is obviously a part of the more complex, "host" concept).

[11] This definition of concepts is functional by its nature. We will try to steer away from any definitions with metaphysical implications, so this one will be appropriate for the purposes of this paper.

[12] The situation is different depending on how one defines concepts.

What this means is that the states, capacities, dispositions, etc. in light of which one meets the possession condition(s) for a simpler concept are "transferred" to a more complex concept that contains it. For example, the possession condition(s) for RED COW are the possession conditions for RED and the possession conditions for COW.

Since a concept being recognitional consists in recognizing things that fall under the concept as things that fall under the concept, a complex concept's possession conditions should include this ability for each of the simple concepts that figure in it. So, being able to recognize red cows as falling under the concept RED COW is warranted by one's ability to recognize red things as falling under the concept RED and cows as falling under the concept COW.

The problem with recognition, as was mentioned earlier, is that it is dependent on conditions. Assuming favorable or ideal conditions makes it impossible to talk about the applicableness of recognition. Therefore, it is generally agreed that having the possession condition(s) for recognitional concepts necessarily includes the ability to recognize good instances of the things that fall under the concept.

This is where problems arise. As soon as we put experience and recognition into the equation, the compositionality constraint loses its ground. Moving away from red cows, let's use an example that's more easily encountered in everyday life. RED HAIR, according to our definitions and the accompanying derivatives, is a complex concept. Its possession conditions must include the ability to recognize good instances of red and good instances of hair. The problem is that things that fall under the concept RED HAIR are generally not good instances of red, even if they might be good instances of hair. As Fodor repeats again and again, goodinstancehood does not compute.

3.2 Counter-argument

If a cognitive scientist defines having a concept as adequately employing it, then there is no inconsistency. Therefore, a scenario where a person possesses a certain concept yet fails to adequately use it is logically impossible. As a consequence, empirical tests that rely on concept use to infer concept possession are faultless.

Alternatively, if we are to go into the argument presented by Fodor, we can use the very same argument but we'll turn it on its head. Fodor states that experience makes it impossible for compositionality to apply to concepts. That might be true in the scenario presented by Fodor. However, he makes a certain fallacy at the definitional level. If we limit the scope of a concept to what are considered its good instances, we do indeed encounter the aforementioned compositionality problem. If we take all instances of a concept into account, no such problem occurs.

Fodor takes possession conditions for concepts, narrows them down to good instances of concepts and then blames experience for the fact that the possession conditions do not compose. Obviously, having a concept needs to imply that you know what conditions must be met in order for an instance to be an instance of the concept you have. That is something entirely different from the practical necessity of narrowing down possession conditions to good instances of concepts. That is done because we'd otherwise never be able to ascribe the possession of any concept to any individual. Still, if perceptual conditions were perfect, an individual that has a concept would have to recognize all instances of that concept.[13]

Therefore, in complex concepts the possession conditions for that concept are made up of the possession conditions of the simple concepts that comprise the complex concept in question. Having the concept RED HAIR necessarily implies that one possesses the concepts RED and

[13] By *recognize* we do not imply any form of perceptual activity; to recognize is to correctly classify an instance of a concept as an instance of that concept, whether it be perceptual or not.

HAIR, if and only if possessing the concept RED and possessing the concept HAIR means being able to recognize all instances of these concepts, whether they be real or not[14].

3.3 Synthesis

If we are to ascribe the systematicity and productivity of language to concepts, the possession conditions for complex concepts cannot contain any empirical conditions among them. As a result, concepts cannot arise as a result of experience but need to be prior to and independent of experience.

4.0 DEFINITIONS

Definitions seem to be the very basis of language. Even though not everybody regularly uses dictionaries to look up definitions of every new word they hear, it is still part of the way in which we understand language works. Every word has a function and/or a definition. Definitions are, ironically, somewhat hard to define. They give you a general idea of what the word or concept[15] applies to. The concept DOG, then, applies to any and all dogs that existed, exist, will exist and could exist in the world, if the concept's definition incorporates all relevant aspects of all dogs that existed, exist, will exist and could exist in the world. Thus, a definition is a tool that helps people categorize empirical phenomena into conceptual categories.

4.1 Against definitions

[14] By *real or not* we imply that certain instances of concepts might not be physically possible, but if a drawing of such instances were presented, a person who possesses the concept in question would have to recognize its instances as such.

[15] We start out with words, but quickly switch to concepts. Most of the things said here will be applicable to both, but in this paper the focus is on concepts only.

Linguists, and therefore cognitive scientists, have long pondered the idea that there must be some kind of a primitive universal language basis of the mind. This primitive universal language would consist of a limited number of basic concepts that would be sufficient to express even the most complex of concepts. The complex concepts would simply be analyzed into their constituent parts, which would have to be reducible to a primitive basis at some level. Therefore, the meaning of a complex expression is arrived at by providing a definition of the complex concept by expressing it using only the expressions of the primitive basis.[16]

However, a barrage of empirical tests found no intuitive set of primitive concepts. As was realized by philosophers a long time ago, regardless of whether you posit the existence of a primitive basis or not, you are going to end up having to provide definitions at one point or another.[17] With that being said, there are only two options one can take when definitions are in question. You can provide definitions of the primitive basis that use other primitive concepts to define another. You can state that the primitive basis does not require definitions because it is intuitively/logically understood as correct.

The latter should theoretically be possible but the empirical endeavors have proven to be in vain. The former essentially involves abandoning the definitional account and it relies on permitting a glaring circularity at the basis of the theoretical framework. Logicians would be appalled. What you are left with is a dilemma with very sharp horns.

As it stands, no definitions provided for primitive concepts stand up to logicians' scrutiny. The reason is painfully obvious. It is impossible to provide a definition that doesn't rely on any concepts, since you're not supposed to use any because not having definitions for the primitive basis implies no words/concepts have been defined (and you can't use non-defined

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[16] Notice the similarity between the primitive basis and the rules of axiomatic logic

[17] Either you don't rely on the existence of a primitive basis and need to provide definitions for every word/concept, or you postulate a primitive basis and are in dire need of definitions for the words/concepts that comprise the primitive basis.

words/concepts in definitions). Therefore, you are left with the other choice of using other primitive words/concepts to define one and that doesn't seem very satisfying.[18]

4.2 Counter-argument

A primitive basis does not necessarily imply the need for definitions. As data is accumulated, statistically significant categories of primitive concepts might emerge that can be used to express an infinite number of complex expressions and are intuitively understood, making definitions redundant.

This is a very optimistic view of the situation, but it isn't unreasonable. However, that is not really a counter-argument since it does imply abandoning the definitional account. It does seem like a proper counter-argument does not exist and that the definitional account should be abandoned altogether. On the other hand, this argument does define what an alternative approach should focus on. Instead of focusing on the semantic soundness with its many criteria, a researcher should simply do what is in his/her job description – research. This way, there is a possibility of breaking the status quo. It should, however, be noted that nothing seems to imply that any amount of research will be able to provide intuitiveness. If primitive words/concepts existed and they were intuitive, there wouldn't be any need for extensive research because the answer would be intuitive and would come naturally. Presently, that does not seem to be the case and the nature of things usually isn't such that something that appears unintuitive suddenly becomes intuitive.

4.3 Synthesis

[18] That doesn't seem like a good argument, but circularity in itself is notorious for being a bad basis for a theoretical framework.

Not only do concepts seem to be independent of experience but they also seem impossible to define. This strongly suggests that the definitional approach towards concepts is going down the wrong road. Although no one would claim that research about the issue should be abandoned, it is clear that a different approach might be more fruitful.

5.0 MIND

The question of the nature of mental entities is also becoming more salient in relation to the issue of how the domain of cognitive phenomena is to be defined in relation to phenomena inside as well as outside the individual subject. The general tendency is to use the word cognition to cover as broad a range of phenomena as possible, rejecting narrow compartmentalization and stressing the essential continuity of all cognitively imbued domains. This is motivated both by opposition to the modular and formal approach of the previous generation of linguists and cognitive scientists and by the development toward applying the central insights of Cognitive Linguistics to more and more areas.

From an internalist perspective, concerned with everything that goes on inside the cognizing subject, this broad use of the term makes it natural to understand most forms of response and processing as coming under the label cognition (…) However, a continuity that generalizes mental phenomena downward to include mechanisms that other authors see as clearly nonmental… raises a philosophical issue with those natural scientists who would like to generalize upwards from purely physical, neurological reactions in order to eliminate all reference to mental phenomena from scientific description. If we generalize from the physical level, the ontological dilemma of reductionism arises (several kinds of apparently different objects are reduced to one kind in the theory). Conversely, if we attribute mental life to objects that do not obviously manifest it, the possibility of using Occam's razor arises, pruning away unnecessary additions to the world picture. Either way, there is a need to clarify the ontology of the object domain. From an externalist perspective, the strategy of emphasizing continuity means that all sorts of human experience—from bodily movement via everyday interaction to religion,

ideology, and politics (…) —are part of the domain of cognition and Conceptualization... Both cognitive science and the philosophy of mind are still faced with the question of how to address the basic problem of accommodating mental phenomena in a nondualist world picture. The nature of mental entities, however, is not only a philosophical problem—it is also a problem for philosophy. The new light thrown upon conceptualization by results from Cognitive Linguistics also puts the ball in the other court: how should philosophy respond?[19]

In this kind of atmosphere, a lot of attention is given to proper wording. Scientists are becoming increasingly self-conscious in their concern for proper terminology, cognitive scientists being especially so. Since cognition is the basic ability of humans and is, obviously, the central concern of cognitive science, an adequate theoretical system has to be in place in order for cognitive scientists to be able to do their job. As is seen from the previous excerpt, that kind of system needs to remain unbiased – it needs to be construed in a way that does not presuppose either a physicalistic or a mentalistic metaphysics.

The term Mind, therefore, is generally considered to be the best suited for cognitive science's theoretical frameworks. Whatever the future outcome of the physicalist/mentalist debate, the term "mind" remains applicable. The mind is considered the base of cognition, the "place"[20] where beliefs, intentions, etc. are situated. What cognitive scientists are talking about when talking about the mind isn't the same as when neuroscientists are talking about the brain. The processes in the brain are supposed to be connected with what occurs in the mind in a certain way. Most scientists suppose that the physical processes and the mental processes are one and the same, observed from a different standpoint. It's just that we don't know enough about the brain to be able to reduce the mental phenomena and drop the mentalistic talk altogether.

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[19](Trask, 2007)

[20] „Place" is put in quotes so as to remain neutral. A physical location would imply we're talking about the brain, not the mind.

The mind is the locus of many concepts cognitive science endeavors to illuminate. It is the basis of all cognition, language, concepts, self-awareness, rationality and thinking.[21] As such, what cognitive science very much needs is a theory of the mind that will provide a robust theoretical framework which will be able to accommodate all of these ideas and weave them into a coherent whole as well as link them to actual research being done on those subjects.

5.0.1 RTM

RTM is short for the Representational Theory of the Mind. RTM is a theory of the mind propagated by certain philosophers of mind/language, including Jerry Fodor. It emerged as a reaction to certain problems arising from the implications of physicalism and functionalism and is supposed to evade the problems those theories were facing.

Functionalism seemed to be on the right track when it comes to mental phenomena. Unlike physicalism, it accommodated different physical systems and allowed physically heterogeneous systems to be functionally isomorphic. In simpler words, different brains/computers could be in the same functional state, regardless of their physical constitution. This, however, is not enough when you want to explain concept acquisition, language learning or thinking. Functionalism does accommodate mental state isomorphism, but it never goes beyond claiming that mental states are just a part of the functional state of a particular system.

This is where RTM comes in. RTM fixates mental states in their relation to the mind, the concepts and the outside world. Mental states are representations of the cognitive input of an individual and as therefore RTM is hyper-realist about mental states.[22] The following argument succinctly explains why hyper-realism about mental states should be a viable choice for cognitive science.

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[21] Again, in many cases *brain* could be used instead of *mind*, but the reasons for not doing so still obtain.

[22] Being hyper-realist about mental states is a metaphysically laden claim. However, RTM is presented here because of the benefits it provides in dealing with certain problems cognitive science has been having.

5.1 RTM – the thinking person's choice[23]

Having two distinct concepts of the same phenomenon is one of the famous Frege problems. It points to the fact that different experiences of the same phenomena result in acquiring different concepts. Depending on your theory, this poses a bigger or a smaller problem. In case of RTM, the explanation is fairly straightforward. Person A experiences phenomenon P and that experience causes him/her to be in a mental state M. Person B experiences that same phenomenon P and that experience causes him/her to be in a mental state M'. These differing mental states cause person A and person B to formulate different concepts that apply to one and the same phenomenon.

This goes hand-in-hand with the first argument about the non-existence of recognitional concepts. Concepts are not something you encounter in your everyday experiences. They relate to our experiences and the mental states representing those experiences. In this way, the non-computability of concepts is resolved by appealing to the very process of how propositions are formed.

Everyday experience results in perceptual input. This perceptual input is interpreted by concepts taking the place of those parts of perceptual input that have the attributes the concept applies to. Relations between concepts are determined by logical operators and the mind computationally arrives at a proposition consisting of concepts and logical operators. This proposition is a representation of the perceptual input. The mind then draws inferences and conclusions from the proposition by trying to place it into the network of previously acquired propositions and their corollaries. Conclusions result in new propositions, some of which continue the thinking process, others result in an action being performed.

[23] Or what I like to call it, „Semantics does not own a barber shop"

It is the mental states and their relation to propositions that represent our experiences and what is responsible for the differences in how the same thing can be referred to in more than one way (RTM claims). Making this claim preserves the principle of systematicity and productivity of concepts while rejecting the claim that experience determines the way concepts are formed.

5.2 Counter-argument

In order to explain research data concerning thought, no reference to mental states needs to be used. Introducing a new theoretical term into a theory that can already adequately explain the data goes against the principle of complexity – a simpler theory with the same explanatory power as a more complex one should be preferred.

5.3 Synthesis

Although it is true that no direct research can prove the existence of non-empirical representations, making a theoretical system containing such terms does not have to tie in with certain metaphysical implications. In the same way that cognitive scientists are using "mind", they can use "mental representation" without prescribing themselves to a specific metaphysical standpoint. The point of this argument is not that RTM is true, but that it is a viable theoretical alternative that agrees with empirical findings and has an added bonus of avoiding certain problems that arise in other theories.

6.0 CONCLUSION

When people say that math does not lie, they are trying to imprint the picture of the infallibility not only of the data gathered, but also of the methods of analysis and the final interpretation of the quantitative and/or qualitative data.

An interpretation is always present. The interpretation of the data must be according to the rules and definitions of the theoretical framework that the particular scientist (or scientists) doing the research adheres to. In most cases, there is a general consensus (an example would be the theory of evolution). However, even within the general framework, distinct „approaches“ are taken, resulting in many unspoken assumptions leaden with semantic and/or metaphysical implications that generally go unquestioned.

This is not to be interpreted as saying anything against the basis of empirical science. The focus here is on the oh-so-often mentioned theoretical frameworks with the invisible baggage they carry. There are no interpretations without a theory on which you base your interpretation. Whatever the theory may be, it is necessary for it to be consistent. However, semantic consistency might not equal mathematical consistency. But which one should have the advantage?

Semantic inconsistency does not necessarily imply a faulty theory. It does necessarily imply that the semantic dimension of the theory in question is faulty. On the other hand, mathematical inconsistency always implies a faulty theory. Still, as was reiterated throughout this paper, math is math. No one is arguing about that. If the predictions are on the mark, the math works. Yet every human being will have the tendency to put this theory into every-day, meaningful terms. And this is where the scientists and the laymen fall equally. Let’s leave the math to the mathematicians but we need to warn them when they’re not making sense.

6.1 Summary of the analysis of arguments

Concepts are independent of experience. They cannot be justified by definitions or by an appeal to intuitiveness. Furthermore, they are the basis on which we interpret our various experiences. A global conclusion would be that the approach towards the mind and other mental entities should gradually steer away from pragmatism and be more open to other alternatives.

7.0 BIBLIOGRAPHY

Brdar, M., Gries, S. T., & Žic Fuchs, M (Eds.). (2011). *Cognitive linguistics: convergence and expansion*. Amsterdam ; Philadelphia: John Benjamins Pub. Co.

Fodor, J. A. (1975). *The language of thought*. New York: Crowell.

Fodor, J. A. (2000). *In critical condition: polemical essays on cognitive science and the philosophy of mind*. Cambridge, Mass.: MIT Press.

Fodor, J. A. (2003). *Hume variations*. Oxford : Oxford ; New York: Clarendon Press ; Oxford University Press.

Fodor, J. A. (2008). *LOT 2: The language of thought revisited*. Oxford : New York: Clarendon Press ; Oxford University Press.

Fodor, J. A. (n.d.). Fodor's Guide to Mental Representation: The Intelligent Auntie's Vade-Mecum. *Mind*, *94*, 55–97.

Geeraerts, D., & Cuyckens, H. (Eds.). (2007). *The Oxford handbook of cognitive linguistics*. Oxford ; New York: Oxford University Press.

Hawking, S. (2010). *The grand design*. New York: Bantam Books.

Trask, R. L. (2007). *Language and linguistics: the key concepts* (2nd ed.). Abingdon [England] ; New York: Routledge.